SERVICE MANUAL

Excavator

880

9-72127

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

Excavator

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9-72127

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SERVICE MANUAL

Excavator

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1. Trim along dashed line.
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TYPE 1-4

880 EXCAVATOR

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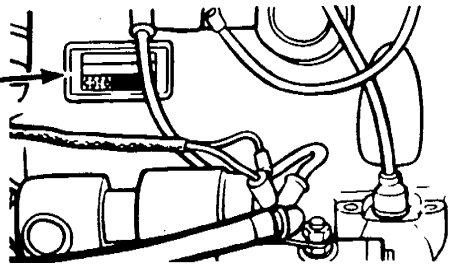
Section 11

GENERAL ENGINE SPECIFICATIONS 880 EXCAVATOR

THE MODEL AND ENGINE SERIAL NUMBER IS STAMPED ON A PLATE LOCATED ON THE SIDE OF THE ENGINE ABOVE THE CRANKING MOTOR.



DIESEL ENGINES

General

Type ..... 4 Cylinder, 4 Stroke Cycle, Valve-in-Head Turbo-Charged
Firing Order 1-3-4-2
Bore ..... 4-5/8 Inches
Stroke ..... 5 Inches
Piston Displacement ..... 336 Cubic Inches
Compression Ratio ..... 16.5 to 1
No Load Governed Speed ..... 2385 - 2415 RPM
Rated Engine Speed ..... 2200 RPM
Engine Idling Speed ..... 725 to 775 RPM
Exhaust Valve Rotators ..... Positive Type
*Valve Tappet Clearance (Exhaust) ..... (Hot) .020 Inch (Cold) .025 Inch
(Intake) ..... (Hot and Cold) .015 Inch

*Hot Settings Are Made After the Engine Has Operated At Thermostat Controlled Temperature For At Least Fifteen Minutes.

Piston and Connecting Rods

Rings per Piston 3
Number of Compression Rings 2
Number of Oil Rings 1
Type Pins ..... Full Floating Type
Type Bearing ..... Replaceable Precision, Steel Back, Copper-Lead Alloy Liners

Main Bearings

Number of Bearings 5
Type Bearings ..... Replaceable Precision Steel Back, Copper-Lead Alloy Liners

Engine Lubricating System

Crankcase Capacity ..... 10 Quarts
with Filter Change ..... 11 Quarts
Oil Pressure ..... 45 to 55 Pounds with Engine Warm and Operating at Rated Engine Speed
Type System ..... Pressure and Spray Circulation
Oil Pump ..... Gear Type
Oil Filter ..... Full Flow Spin on Type

Fuel System

Fuel Injection Pump ..... Robert Bosch, Type PES Multiple Plunger
Pump Timing ..... 30 Degrees Before Top Dead Center (Port Closing)
Fuel Injectors ..... Pencil Type (Opening Pressure 2800 PSI)
Fuel Transfer Pump ..... Plunger Type, Integral Part of Injection Pump
Governor ..... Variable Speed, Fly-Weight Centrifugal Type, Integral Part of Injection Pump
1st Stage Fuel Filter ..... Full Flow Spin on Type
2nd Stage Fuel Filter ..... Full Flow Spin on Type

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SECTION

13

SCHEDULED MAINTENANCE AND LUBRICATION GUIDES

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General Maintenance of Component Parts and Hydraulic System with Lubrication Guides, Charts and Photographs.

LUBRICANTS and FLUIDS CHART

LUBRICATION POINTS	CAPACITY	RECOMMENDED LUBRICANT
ENGINE CRANKCASE	10 U.S. qts. 8 Imp. qts.	Engine oil meeting following specifications: Service DS; Series 3 & MIL-L-45199
ENGINE CRANKCASE (W/FILTER CHANGE) SEE NOTE BELOW	11 U.S. qts. 9 Imp. qts.	Above 32° F..... SAE 30 10°-50°..... SAE 20W Below 32°..... SAE 10W
COMPLETE HYDRAULIC SYSTEM HYDRAULIC TANK	33 Gals. 18.0 Gals.	Case TCH Fluid or as Alternate: SAE 10W - O°F, to 180°F, system temperature; SAE 20 - 20W 50°F, to 210°F, system temperature. Arctic Conditions - SAE 5W or 5W-20.
FUEL TANK	75 Gals.	No. 2 diesel fuel
DRIVE TRANSMISSION	4 quarts	SAE 90, API-GL4
SWING GEARBOX	11 pints	SAE 90, API-GL4
PRESSURE FITTINGS		Multipurpose #1 Lithium "Soap Base" Grease - below 32°F. Multipurpose #2 Lithium "Soap Base" Grease - above 32°F.
ENGINE COOLANT	9.5 U.S. gals. 7.6 Imp. gals.	1/2 high boiling point permanent (ethylene glycol) type antifreeze, 1/2 water (protects to -34° F.)

NOTE: It is extremely important that a stable, high quality Engine lubricating oil be selected for use in the Case Diesel Engine. It is also extremely important that the correct weight (SAE Viscosity Rating) of oil be selected for the prevailing air temperature. This assures you that the oil will remain fluid or free flowing within the specified temperature ranges.

Figure 1

Figure 2

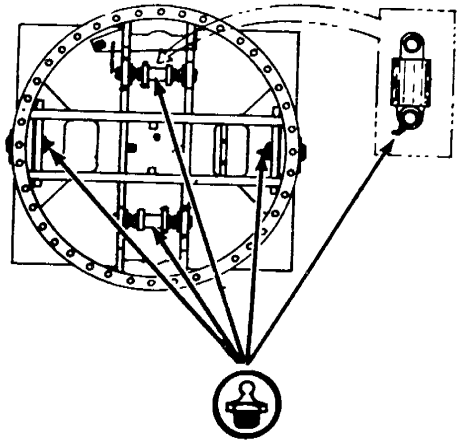

Figure 3. Location of Grease Fittings on Leveler Assembly

Figure 4

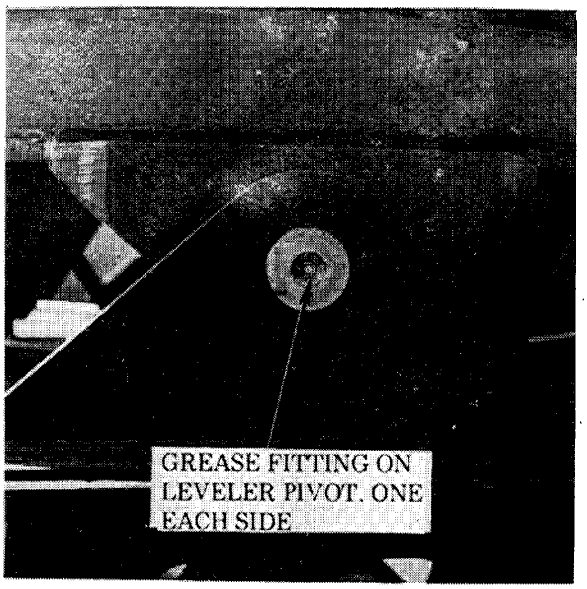

Figure 5

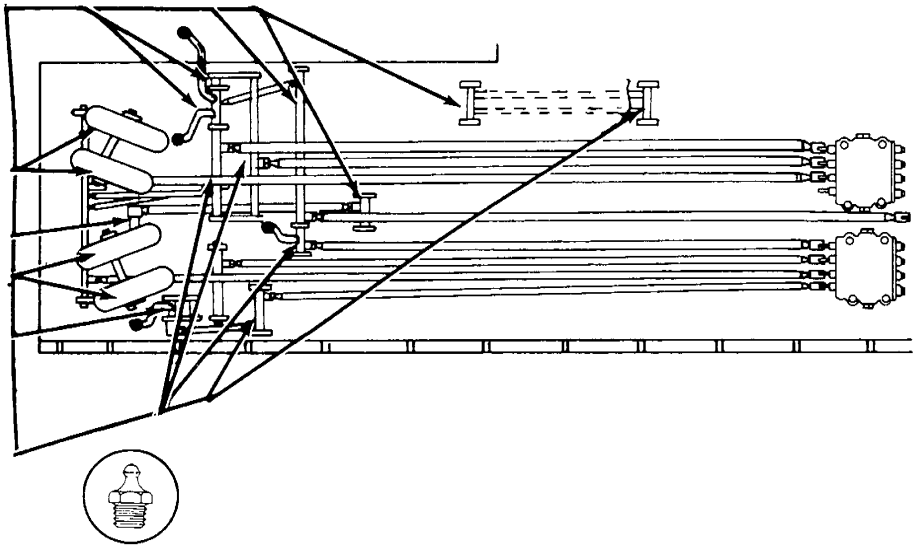

Figure 6. Location of Grease Fittings on Control Linkage and Bellcranks.

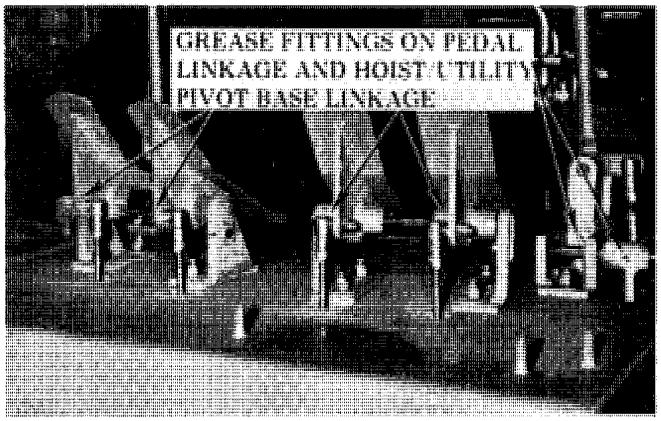

Figure 7

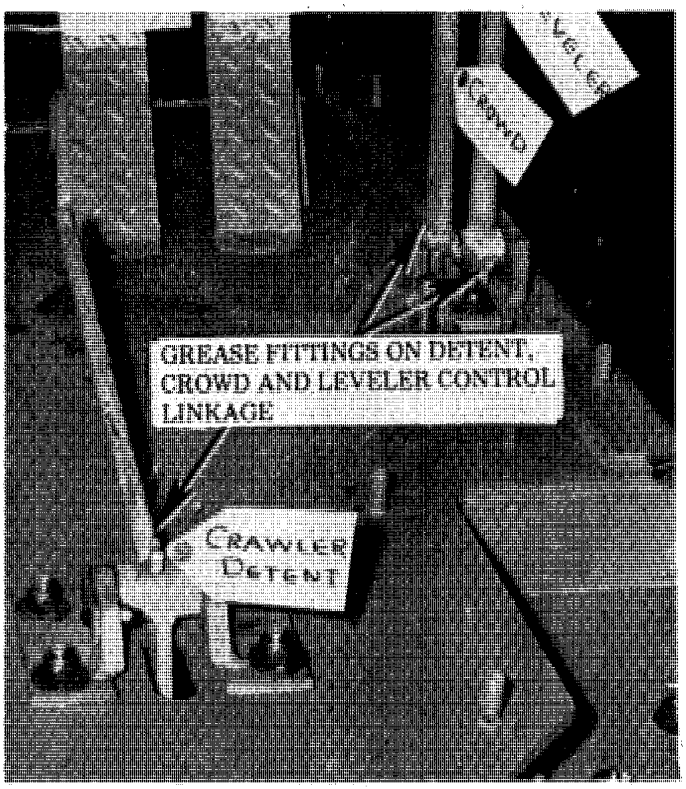

Figure 8

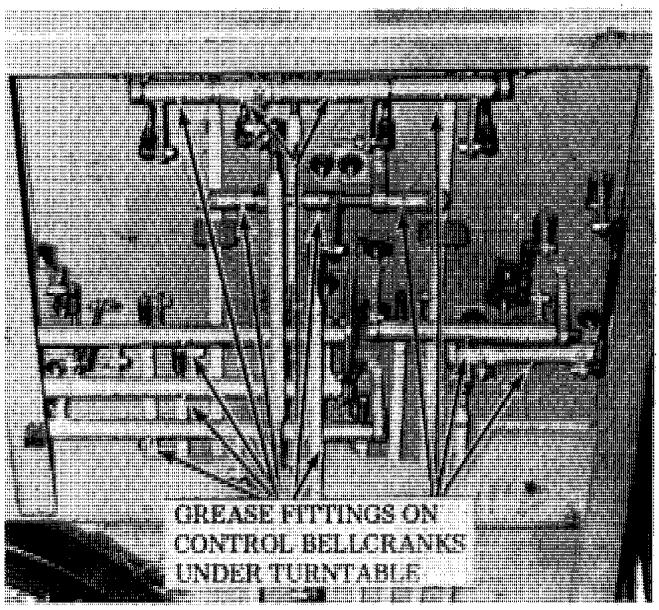

Figure 9

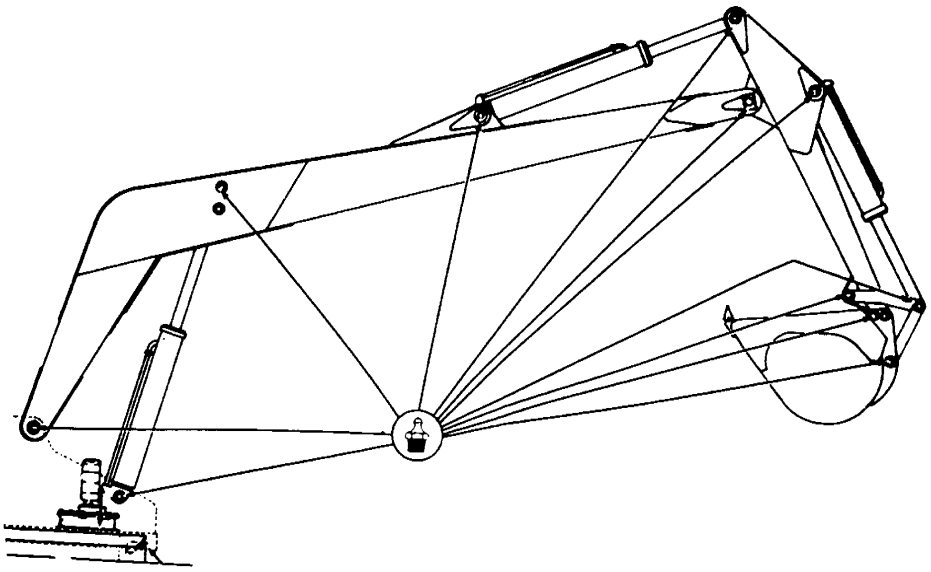

Figure 10. Location of Grease Fittings on Boom and Cylinders.

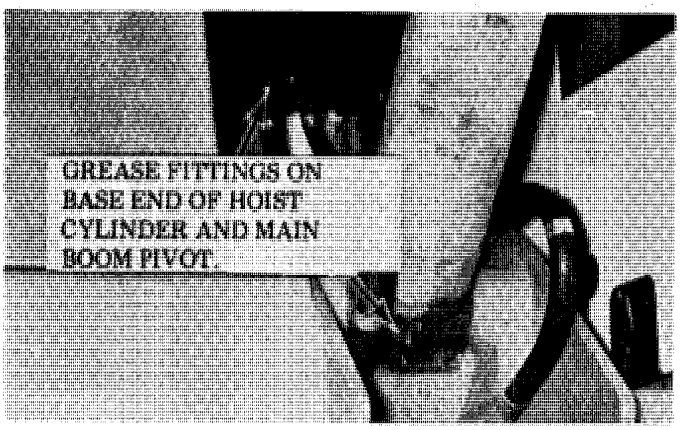

Figure 11

Figure 12

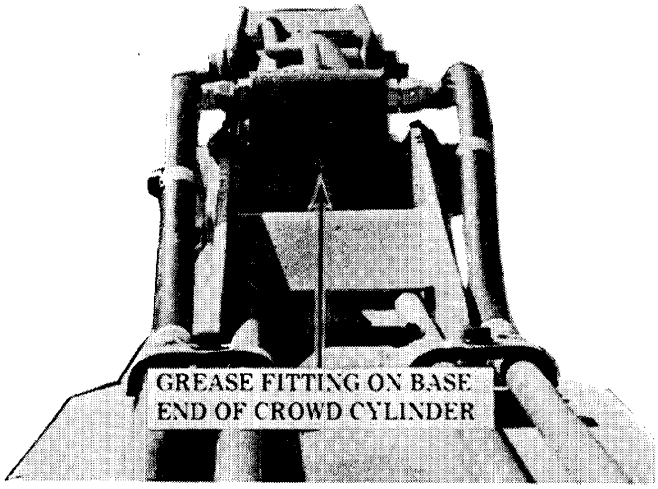

Figure 13

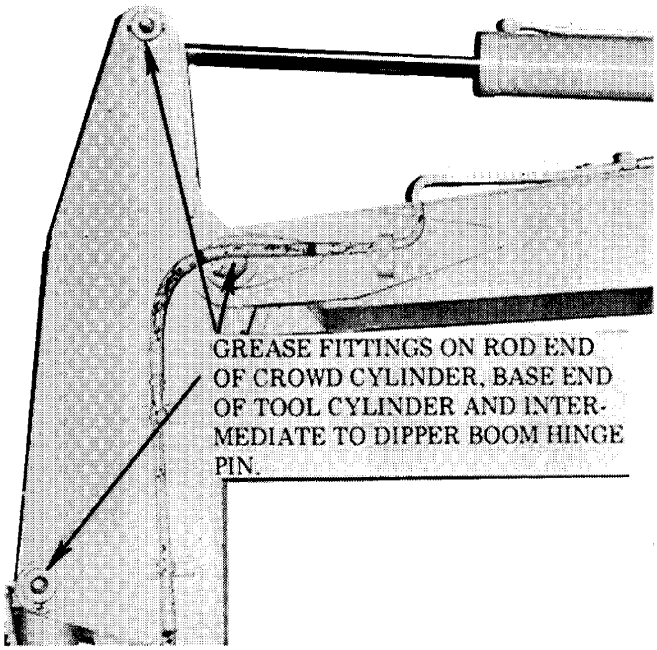

Figure 14

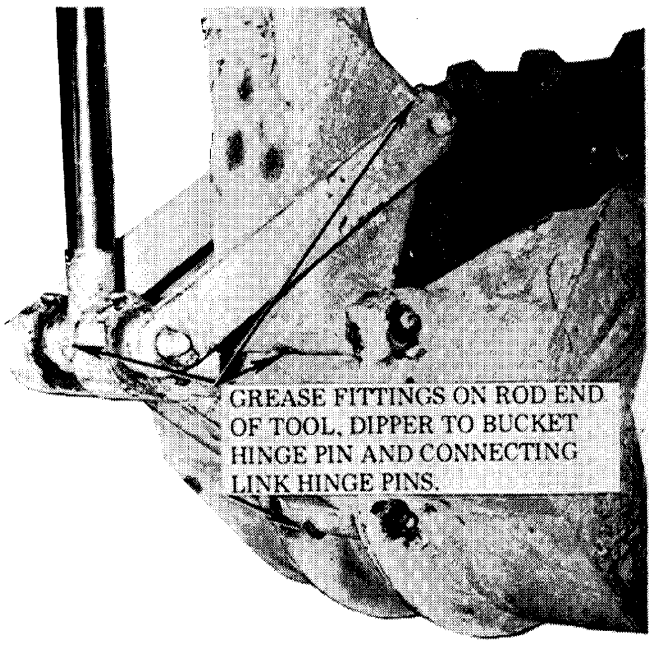

Figure 15

ENGINE OIL AND FILTERS

CHECKING ENGINE OIL LEVEL

Check the Engine oil level daily, using the dipstick on the right side of the Engine (rear of Excavator). See Figure 16. Oil level should be between the Full and Low marks on the dipstick. Do not check the oil level while the machine is running. Be sure the Excavator is level when checking the oil.

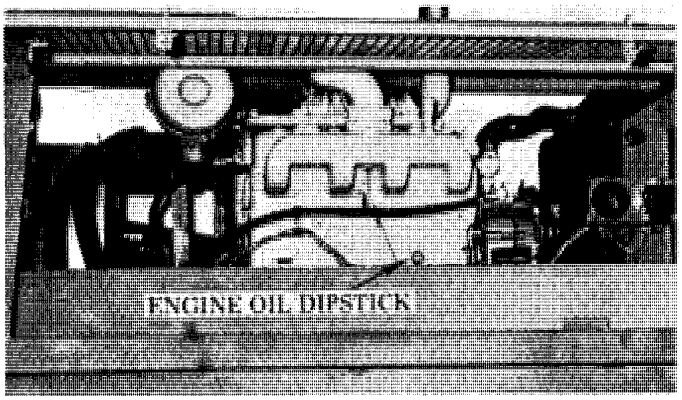

Figure 16

CHANGING ENGINE OIL

The engine oil should be changed every 100 hours of operation, or every two weeks, whichever occurs first. This is a suggested maximum; if operating conditions are severe, the oil should be changed more often.

REPLACING ENGINE OIL FILTER

The spin-on type oil filter is located on the left hand side of the engine, see Figure 17.

You cannot determine the condition of an oil filter by appearance. It may not appear excessively dirty, but it can be completely contaminated with abrasive material. Therefore, change the oil filter AT LEAST every second oil change.

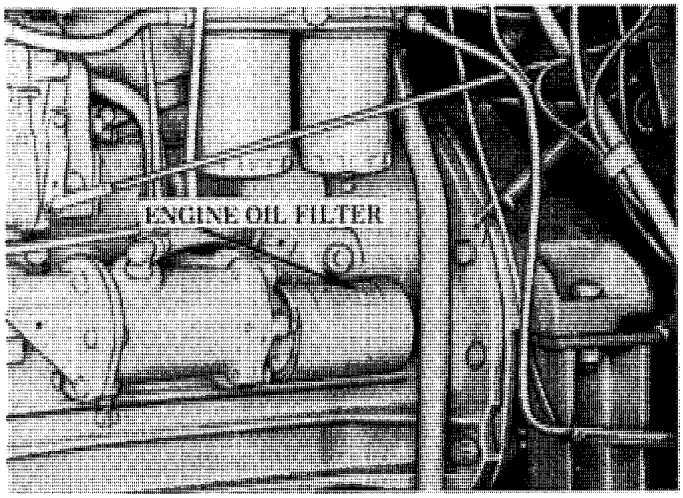

Figure 17

REPLACING FUEL FILTERS

Service the fuel filters every 500 hours, or when loss of horsepower is evident. To correct loss of power, service the filters in the following order: (1) Transfer pump (2) First and Second Stage.

TRANSFER PUMP FILTER BOWL

The filter bowl, located beneath the fuel transfer pump should be drained of accumulated water and sediment after every 300 hours of operation. See Figure 18.

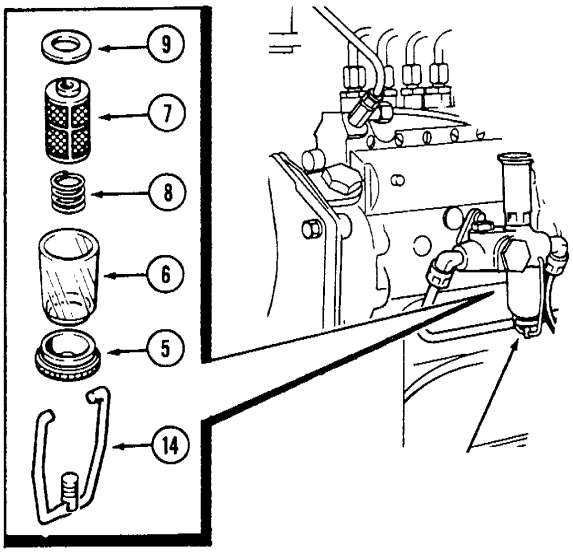

Figure 18

Loosen the bowl bail. Remove bowl with gasket, spring and screen, and clean out sediment and water. Reseat screen, spring and gasket, and replace bowl in bail. Tighten bail so that bowl is retained, but still loose. Loosen hand pump plunger on transfer pump and operate hand pump until the bowl overflows. Then tighten bail nut being careful not to overtighten and crack the bowl.

FIRST AND SECOND STAGE FILTERS

1. See Figure 19. Clean filter bodies and surrounding area. Remove both filters with a strap wrench. Discard the filters.

2. Apply a thin film of grease to the gaskets on the new filters. Install both by turning on clockwise until gasket contact is made. Hand tighten 1/2 to 3/4 turn. Bleed system.

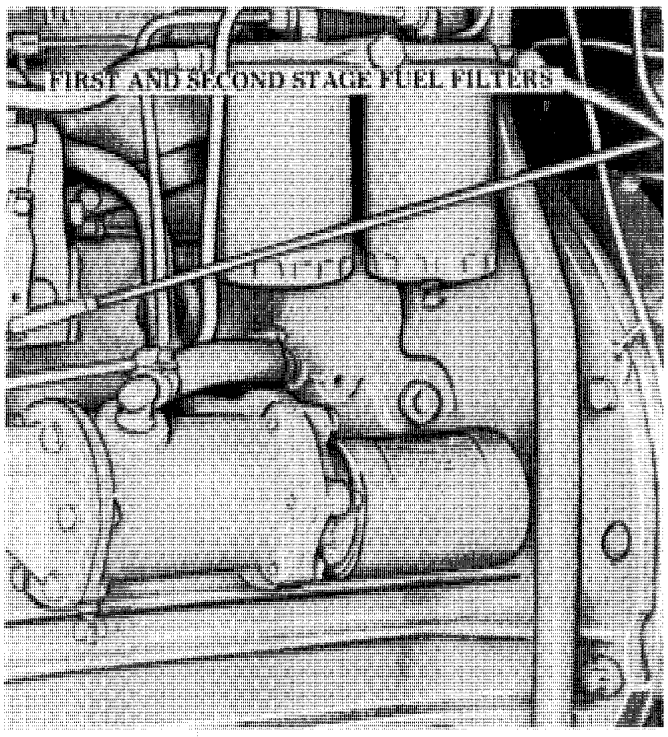

Figure 19

FIRST STAGE FUEL FILTER

If accumulated water is suspected in the first stage fuel filter, loosen the drain plug on the filter bottom. Do not remove the plug. Allow the fuel to drain until clear of water. Tighten the drain plug. See Figure 20.

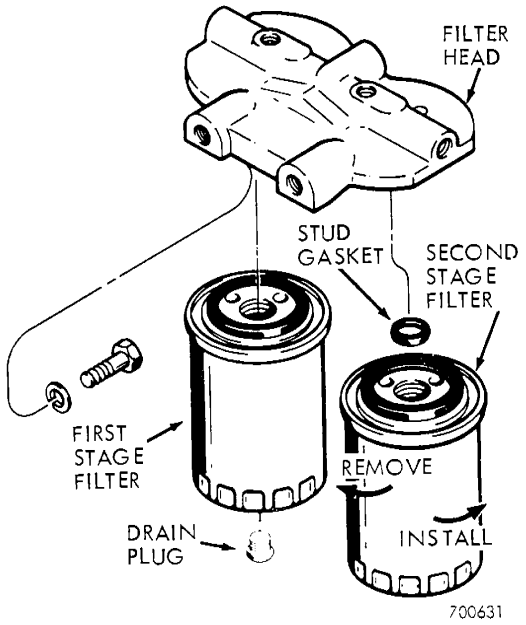

Figure 20

BLEEDING THE SYSTEM

Air must be bled from the fuel system if (1) the engine runs out of fuel, (2) the fuel system is serviced, or (3) the engine is taken out of storage.

1. Loosen the hand pump plunger on transfer pump and open bleed screw on top of the first stage filter. Operate the hand pump until clear fuel appears.

2. Bleed the second stage filter in the same manner as the first stage.

3. Start the engine. If roughness or missing is detected, bleed each injector line by "cracking" open the tube nut at the injector.

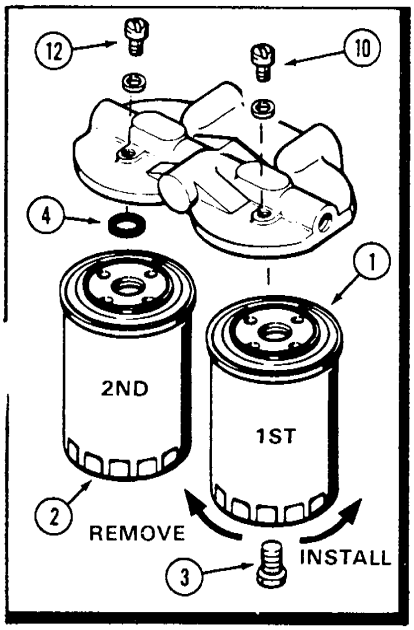

Figure 21

AIR CLEANING SYSTEM

Although filter elements are normally considered expendable, proper and careful cleaning can extend their life several times. Maintenance schedule will depend upon the dust conditions in which the engine operates. The service interval can vary from once a day to once a year. Because some engines operate constantly in a dusty environment and others operate in relatively clean air, each engine air cleaner will require servicing at different intervals. Work out a schedule that is frequent enough to avoid down-time for service on the job, but doesn't over-service. Over-service is common and can be costly.

DUST COLLECTION CUP

Empty the dust cup at regular intervals. These intervals may vary from 4 hours to 600 hours, depending on dust conditions. Do not allow the dust level in the cup to build up to closer than 1/2 inch from the slot in the dust cup baffle. Refer to Figure 22. Stop the engine. Remove the dust cup, then remove the baffle from the cup and empty the dust. Replace the baffle in the cup, making sure that the baffle is properly seated. Check the dust sealing edge for damage. Check the dust cup gasket (if so equipped). Replace the dust cup and make sure it is properly positioned on the air cleaner body. The proper cup position is indicated by the arrows located on the bottom of the cup. Also, the slot in the dust cup baffle must be at the top.

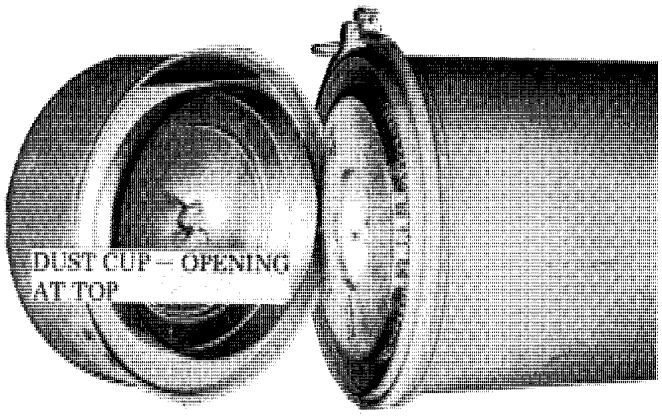

Figure 22

MAIN ELEMENT

Excessive smoke or loss of power are good indications that the main element should be cleaned or replaced. Check the restriction indicator mounted between the engine and the air cleaner for a correct analysis of the condition of the main element. Try to clean the element before the indicator reaches the red portion of the gauge.

NOTE: In the event you feel the restriction indicator is malfunctioning, remove it and place a water manometer tube in its place. Start the engine and check the amount of restriction on the manometer. The main element should be cleaned or replaced when restriction reaches 15 inches of water.

If you used a manometer, as in the above Note, be sure to replace the restriction indicator or put a plug in the restriction tap. This will prevent the entry of dirt or foreign material into the system.

Standby filter elements, either new or cleaned, will speed servicing and reduce down-time.

CAUTION: Do not over-service. Over-servicing increases the chances of damage to the filter element and getting dust into the engine.

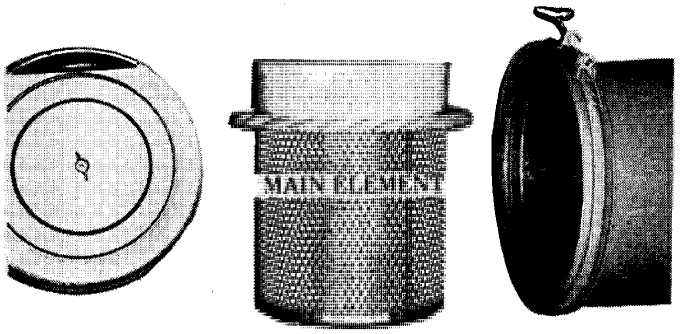

Figure 23

CAUTION: Do not start the engine when the filter element is removed from the air cleaner. While cleaning element, place a warning tag on the air cleaner and another tag on the starting switch.

WASHING THE ELEMENT

Washing is the preferred method of cleaning the element because it removes more dust and soot and restores the element to an almost new condition. This will result in better engine performance and longer intervals between service. It is handy to have a spare element available for use while the serviced element is drying. This will reduce down-time to only a few minutes and allow sufficient time to properly service the restricted element.

To wash the filter element, use Case Filter Element Cleaner, Part No. A40910, which is available from your Authorized Case Dealer. Mix 2 ounces of cleaner to one gallon of water (temperature 70° to 100° F.). Soak the element in this solution for 15 minutes; see Figure 24. Rinse thoroughly. Do not use water pressure over 40 PSI at the nozzle. Let the element air-dry completely before installing. Do not use air pressure to dry the element.

Figure 24 - Soaking the Element

COMPRESSED AIR CLEANING

The element can also be cleaned with compressed air, using a maximum 100 PSI pressure at the nozzle. Keep the air nozzle a reasonable distance from the filter element. Use of compressed air is not always recommended because it will not remove carbon and soot like washing does.

The filter element must also be checked for dents in the metal covering. Any dent in the covering is a potential puncture because it lets the paper element rub the dent putting a hole in the paper. If any fuzz is noted around a dent or any place in the element, the element is punctured. Replace it immediately or serious damage will result. Do not accept a new filter or install a new or used filter if the metal covering is dented.

CAUTION: Never attempt to clean the element by rapping it. Rapping the element will dent the metal covering. The inner paper element will in turn rub this dent, causing the element to puncture.

INSPECTING ELEMENT

To inspect the element after it is clean and dry, use a light bulb. By rotating the filter element against the light, the element can be checked for damage or pinholes. Visually check the rubber gasket for damage. If any holes appear in the element or the gasket is damaged, the element must be replaced.

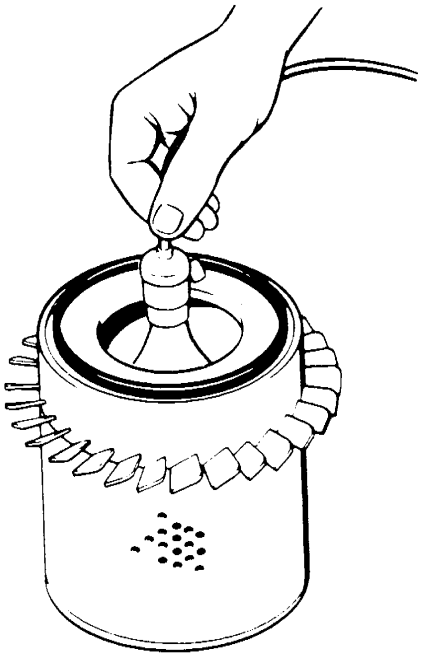

Figure 25 - Inspecting the Element

COOLING SYSTEM

RADIATOR CAP

Coolant capacity .....9.5 US gallons
Radiator cap pressure.....7 PSI
Thermostat range .....
starts to open at 175°-182° F., fully open at 202° F.
Standard factory coolant installation.....
.....50% water, 50% antifreeze

The radiator pressure cap serves two purposes:

1. It pressurizes the cooling system at 7 PSI, thereby raising the boiling point of the coolant, and reduces loss of coolant by evaporation, surging and boiling. The efficiency of a pressurized system is maintained by immediate repair of leaks and replacement of weak or defective parts.

2. It serves as a relief valve if system pressure rises above 7 PSI.

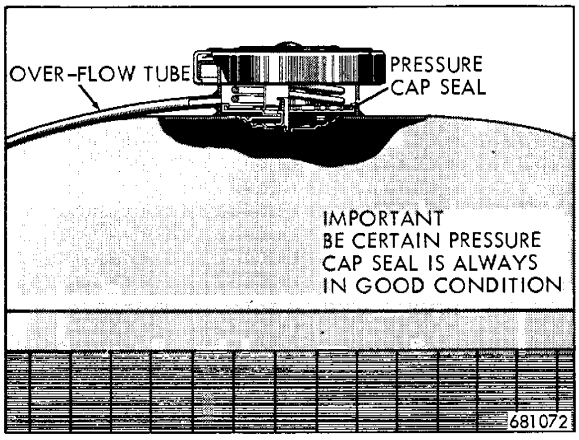

Figure 26 - Radiator Pressure Cap

WARNING: Always remove the pressure cap slowly. Quick removal of the cap can reduce system pressure enough to make the coolant boil out of the radiator opening and result in painful burns to the operator.

ANTIFREEZE

Use only a reputable brand of permanent type, high boiling point, ethylene glycol antifreeze.

The crawler is shipped from the factory with a 50% solution of permanent type (ethylene glycol) antifreeze, and 50% water. The antifreeze should never be used for more than one winter due to the natural breakdown of rust inhibitors.

Do not mix different types or brands of antifreeze in the cooling system. They may not be chemically compatible, and the mixtures will not give correct test readings.

NOTE: The use of low boiling point, alcohol type antifreeze is not recommended. Evaporation loss would be excessive because the alcohol boiling point is frequently below the crawler minimum operating temperature.

CLEANING THE SYSTEM

Clean the cooling system at least twice a year or every 1000 hours of operation. Clean oftener in areas where hard water containing scale forming materials is all that is available.

To clean the cooling system:

1. While the coolant is still hot, open the radiator drain valve and the engine block drain valve. See Figure 27. Drain all coolant and close the valves.

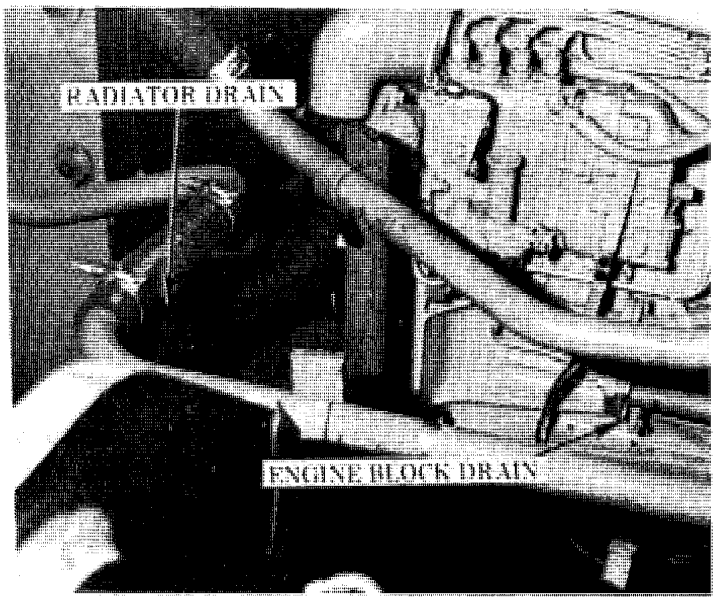

Figure 27

2. Add a radiator cleaner to the system and refill with clean water. Any nationally known commercial brand cleaner marketed by a reputable manufacturer may be used. Follow the directions provided with the cleaner.

3. After draining the cleaning solutions, flush the system with clean water before refilling the radiator.

4. Check the hoses, elbows, pump and water manifold for leakage.

5. Make sure the outside of the engine is clean and that the radiator fins are free of dirt accumulations. Blow dirt and trash out of the radiator with compressed air.

6. Refill the cooling system to within 2 inches of the top of the radiator neck.

7. Run the engine approximately 5 minutes to bleed the air out of the system. Recheck the coolant level and add coolant, if necessary.

WATER COOLANT

If water alone is used in the cooling system during the summer months, add a rust inhibitor.

If possible, use soft water. If only hard water is available, check the system at frequent intervals for signs of scale formation.

CAUTION: Never pour coolant into a hot engine. The engine block or cylinder heads could crack because of sudden contraction caused by temperature differences between the metal and the coolant.

Never remove the radiator cap when the engine temperature gauge shows the engine is overheated. Coolant may boil away allowing engine parts to cool too fast and causing the block or heads to crack.

TEMPERATURE RANGE

The cooling system is equipped with a thermostat that starts to open at 175°-182° F., and is fully open at 202° F., and remains open above 202° F. Coolant temperature will vary according to the excavator workload. If the radiator is equipped with a properly functioning 7 PSI pressure cap, the excavator can operate with engine coolant temperatures up to 230° F. without damage to the engine or loss of coolant.

CHECKING THERMOSTATS

During operation, check the engine temperature gauge frequently. Should the engine warm up very slowly under load, or if the engine temperature gauge needle does not reach the recommended operating range, remove and check the thermostat. This can be done by suspending the thermostat in a pan of water that is being heated and checking the opening temperature with a thermomoter.

If a thermostat is inoperative, discard it and install a Genuine Case thermostat having the same heat range as the original. The thermostat must start to open at 175°-182° F. and be fully open at 202° F.

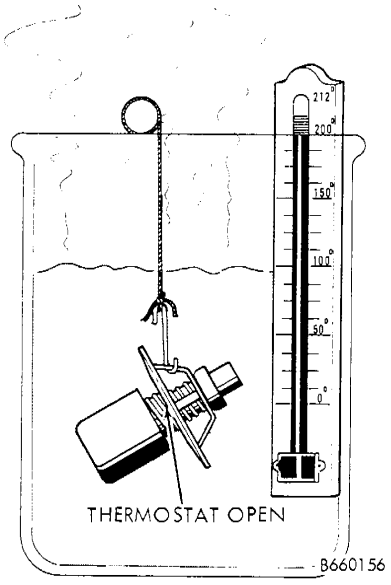

Figure 28 - Checking Thermostat

An engine that is not working under a load may be slow to warm up to operating temperature. This is normal and is due to the large capacity of the cooling system. However, when the engine is under load, it should warm up reasonably soon.

REPLACING THERMOSTAT

To replace the thermostat:

1. Partially drain the cooling system to below the level of the thermostat and raise the access cover on top of the hood.
2. Remove the two thermostat housing bolts and lockwashers, and loosen hose clamps on the upper hose.
3. Remove all the old gasket material.
4. Install new thermostat.
5. Install a new gasket on water manifold. Place a thin film of sealing compound on both sides of the gasket.
6. Reinstall housing, housing bolts and hose clamps.
7. Close coolant drain valves. Refill cooling system. Operate engine for about five minutes and check for leaks. Check coolant level and add coolant if necessary.

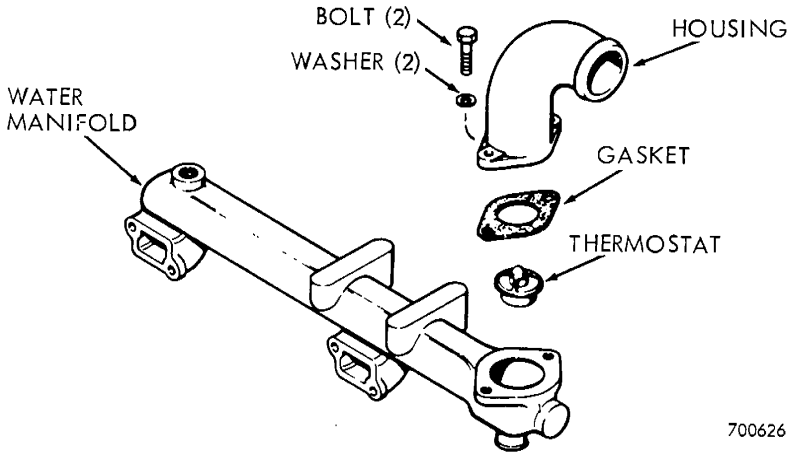

Figure 29 - Installing Thermostat

FAN

A pusher type fan is standard equipment. A suction type fan is available as optional equipment from your Authorized Case Dealer.

If necessary to replace the fan, always order a Genuine Case fan intended for the engine so that the cooling system will operate at top capacity.

FAN BELTS

Check the engine fan belts weekly or every 50 hours. The belts drive the fan, water pump and alternator. If too tight, there is rapid wear of alternator and water pump bearings. If too loose, the belts will slip, wear fast, and permit engine overheating and battery run-down.

BELT TENSION

Properly adjusted vee belts can be depressed 1/2 inch midway between the alternator pulley and then fan pulley. To tighten belts, loosen alternator mounting bolt at adjusting strap, and swing alternator away from machine.

CAUTION: The fan belts must ride on the sides of the pulley — never on the bottom.

The fan belts are a matched set. Do not replace the belts individually. Always use a matched set.

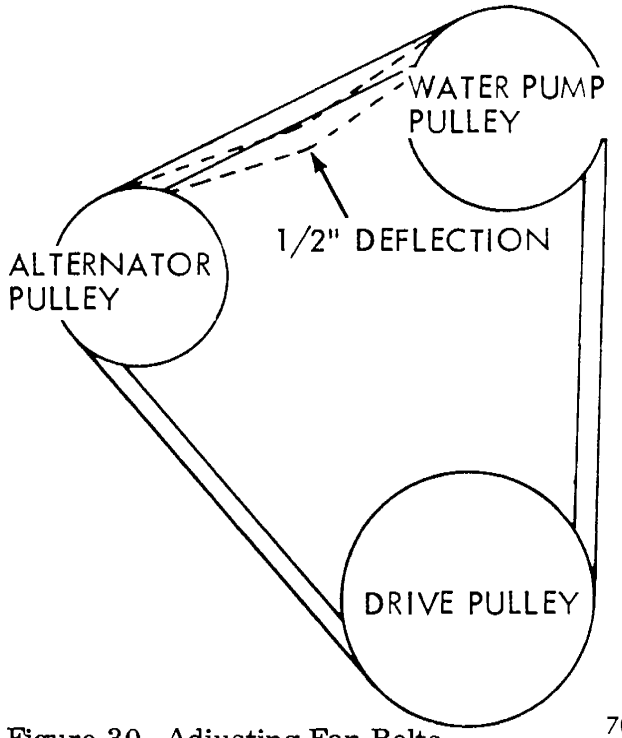

Figure 30 - Adjusting Fan Belts

TURBOCHARGER

The turbocharger, which is standard equipment on the 880 Excavator, is an economical method of boosting engine power, but it is critically dependent on:

1. Clean and sufficient air intake.
2. Clean and adequate engine oil.

It is mandatory that regular maintenance and careful checking be done on the air cleaner system and the engine oil filtrating system.

AIR CLEANING

The high speed turbine and compressor of the turbocharger are highly vulnerable to foreign particles in the air intake and exhaust. To avoid such damage:

1. Follow closely the maintenance schedule for the air cleaning system.
   a. Keep filter and dust cup free and unclogged.
   b. Replace damaged or defective filters immediately.
2. Inspect air intake lines and connections for leaks which let foreign particles bypass the air cleaning system.

LUBRICATION

ENGINE OIL

Engine oil acts as a lubricant and a coolant for the turbocharger bearings, and as a heat barrier between the hot turbine and compressor. Dirty oil leads to turbocharger overheating failure, and possible damage to the engine itself. To avoid such damage:

1. Change engine oil on a regular schedule, and as often as necessary to keep it clean.

2. Change the oil filter on a regular basis, or as often as necessary to keep it and the oil clean.

OIL FAILURE

In addition to dirty oil, which signals poor maintenance, the following can cause turbocharger damage or failure:

1. OIL LAG - This problem occurs:

   a. During cold weather starting, when engine oil is too stiff to flow quickly to turbocharger bearings.

   b. After oil and filter changes, when the lubrication system needs some priming.

   c. While starting under load, before the oil is warm enough to adequately lubricate load-bearing components.

Do not rev up the engine immediately after a cold start. Warm up the engine for about five minutes at 1/4 throttle and no-load. Engine oil will have a chance to warm up and adequately lubricate turbocharger bearings before load conditions are imposed on them.

If the excavator has been in storage for a month or more, the turbocharger lubrication system should be primed by cranking the engine for about 30 seconds with the fuel supply shut off.

2. OIL STARVATION - Dirty oil leads to worn bearings, oil pump failure, plugged oil lines and clogged filters. These problems in turn cause oil starvation to critical turbocharger components which are damaged by loss of oil pressure and overheating. Clean engine oil and adequate filtration will prevent oil starvation.

STOPPING

If the engine has been under heavy, severe load and is shut off without several minutes of idling for cooling purposes, the turbocharger will keep rotating at high speed without lubrication or cooling. Reduce engine speed to 1/2 throttle for about 5 minutes to lubricate and cool the turbocharger while it is decelerating.

If the excavator is kept outdoors overnight, cover the exhaust stack to keep moisture out of the turbocharger bearings. The stack should also be covered when moving the excavator on a low-boy trailer or on any other method of transporting.

HYDRAULIC SYSTEM

HYDRAULIC RESERVOIR OIL LEVEL

The oil level in the hydraulic reservoir should be checked daily or every 10 hours, whichever occurs first.

The oil level can be checked by removing the filler cap and checking level on the dipstick. Clean thoroughly around the filler opening before removing the cap. Oil should be at the level of the FULL mark. Figure 31 shows location of fill cap on reservoir.

Before checking oil level, completely extend the bucket and dipper cylinders, and retract the boom cylinder. The turntable should be level and the machine parked on a level surface.

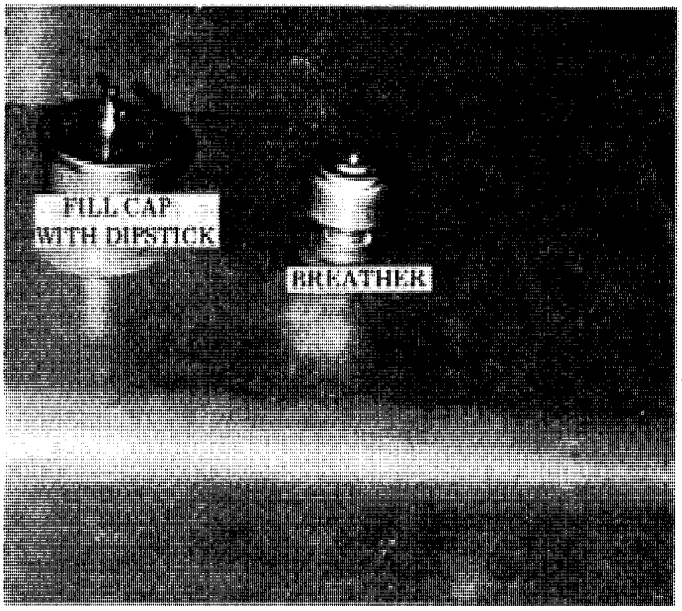

Figure 31

CHANGING HYDRAULIC OIL

The hydraulic oil should be changed every 1500 hours, or semi-annually, whichever occurs first. Unless there is evidence of oil contamination, a reservoir drain and refill is sufficient. After the crawler's first 20 hours of operation during the run-in period, change the oil and the oil filters.

The oil should be drained while at operating temperature. At the same time, the 100 Mesh Screen in the reservoir outlet should be removed and cleaned in a non-flammable solvent.

Refill the reservoir with clean Case TCH Fluid in the amounts specified under Refill on page 3 .

HYDRAULIC RESERVOIR BREATHER

The reservoir breather should be serviced whenever the hydraulic oil is changed, every 1500 hours or twice yearly.

The breather is located on top of the tank, encased in a red housing. Remove the breather and wash the element in a non-flammable solvent. Blow dry with compressed air. Refer to Figure 31.

HYDRAULIC FILTERS (IN-LINE AND IN-TANK)

There are three hydraulic filters incorporated into the 880's hydraulic oil system. Two of the filters are rated at 100 Mesh Screen, and the third is a 33 Micron element. One of the 100 Mesh Screen filters is located in the outlet port of the Hydraulic tank, see Figure 32; the other will be found in the output line from the oil cooler leading to the #1 pump section (the section feeding the three spool valve bank). Refer to Figure 33.

The 33 Micron Filter will be found in the return line from the three spool valve bank leading to the #2 section of the pump (the section feeding the four spool valve bank, and the one spool leveler control valve. Figure 33 gives location.

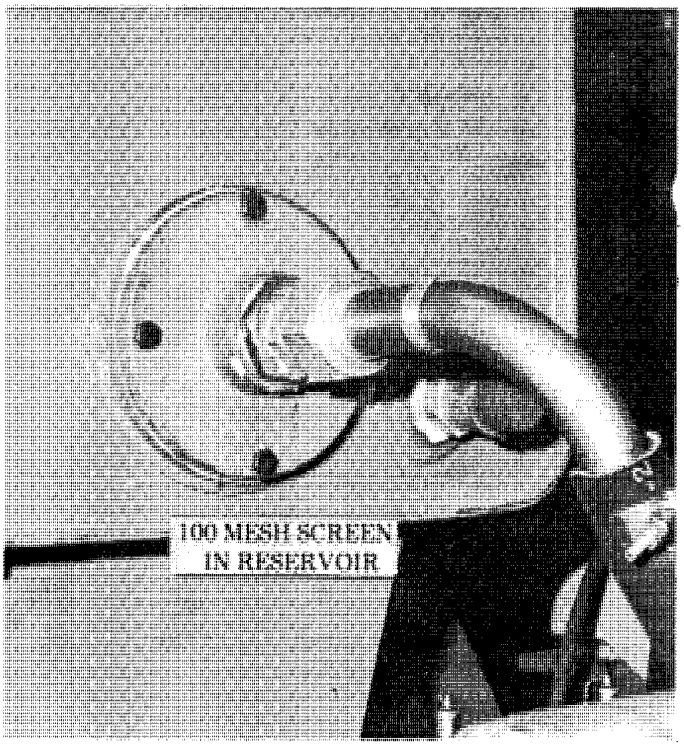

Figure 32

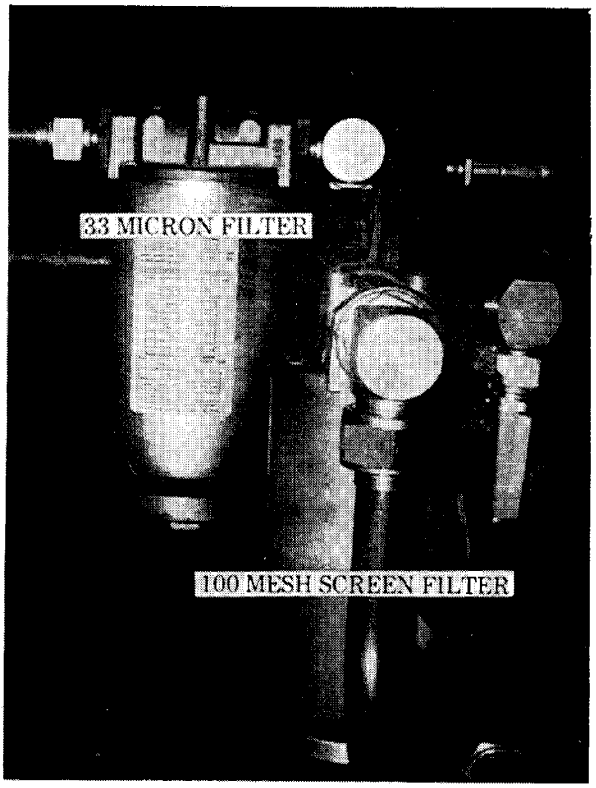

Figure 33